

GRID MANAGEMENT: TRANSFORMING CHALLENGES INTO OPPORTUNITIES

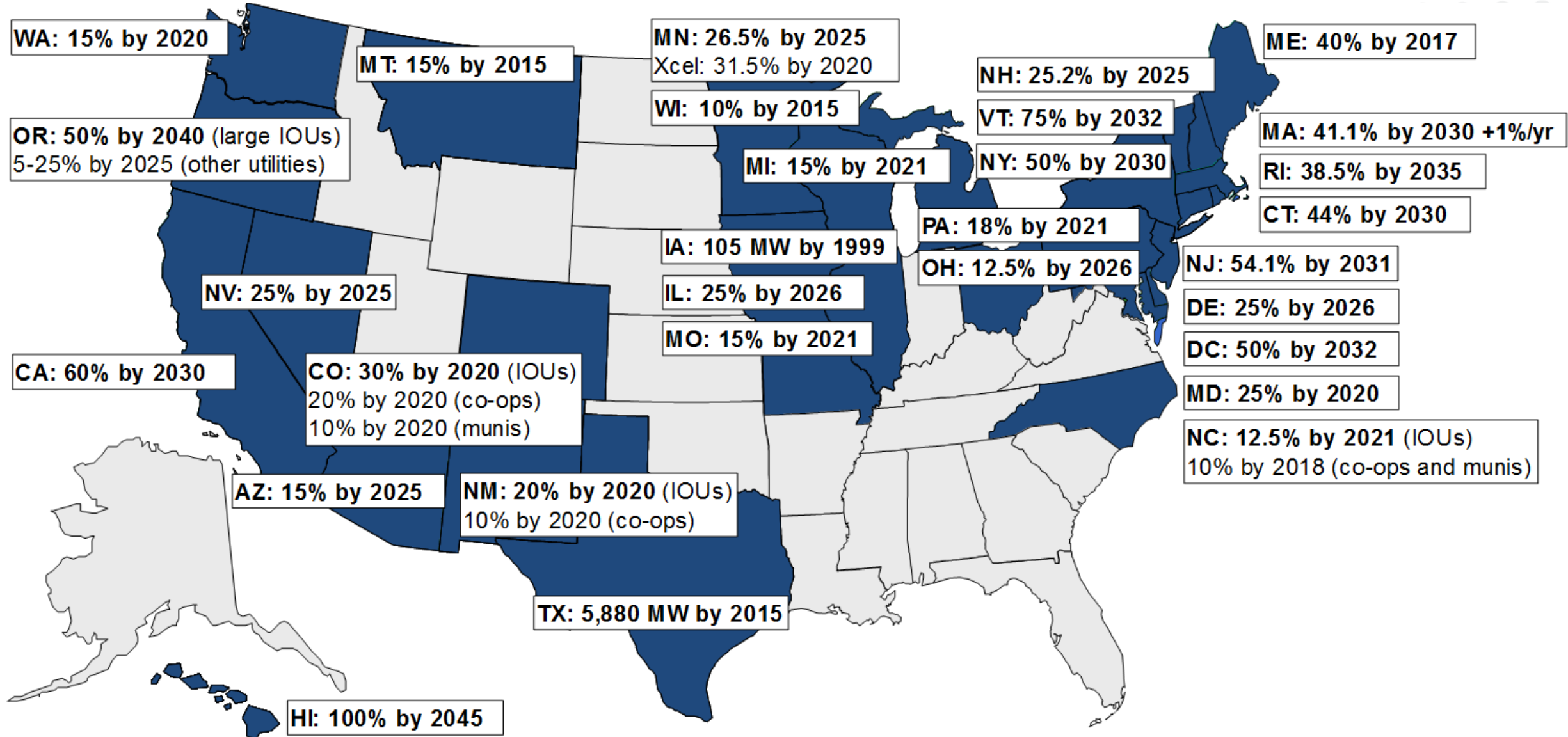
KORY W. HEDMAN, PROGRAM DIRECTOR, ARPA-E



Overview: Innovation in Grid Management

- Goal: Utilize All Resources for Grid Operational and Reliability Requirements
- Need: Understand and Leverage Resource Flexibility Relative to their Dependability
- Outcome: Risk-Driven Grid Management and Operational Paradigm

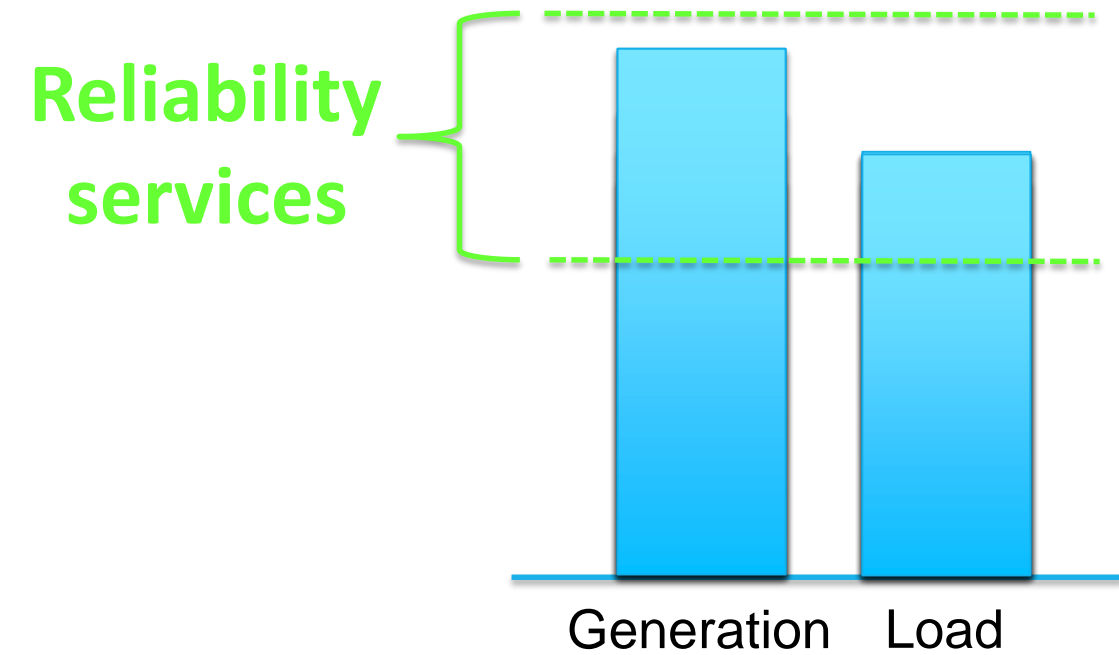
Renewable Portfolio Standards (RPS)



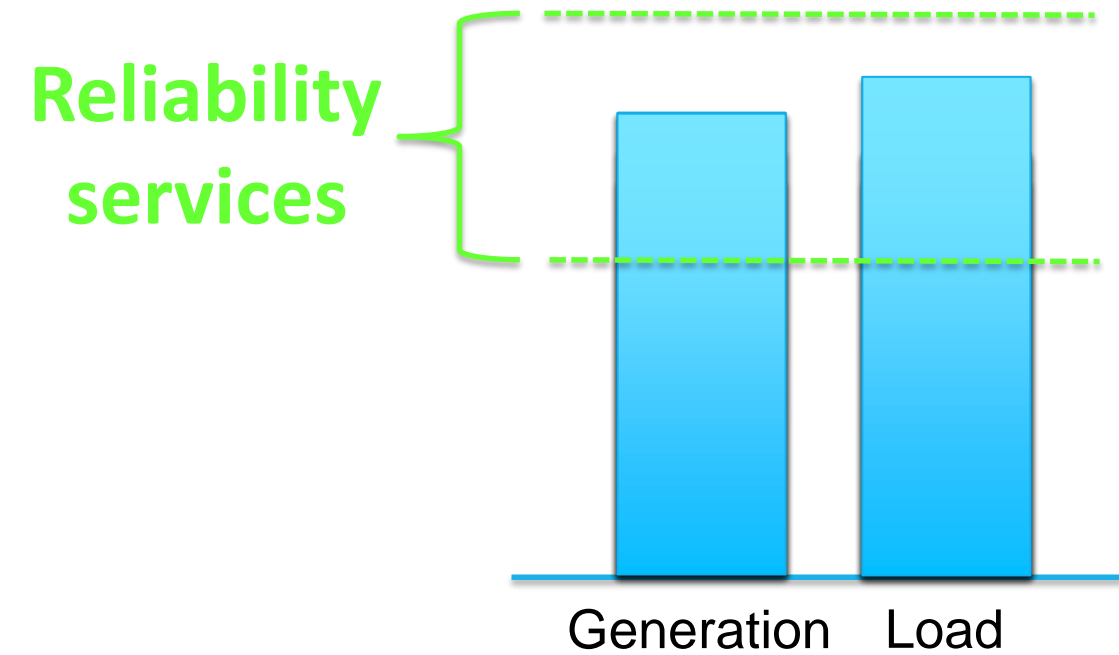
2018 Renewable Energy Production: 17% (EIA)

Source: Berkeley Lab (November 2018)

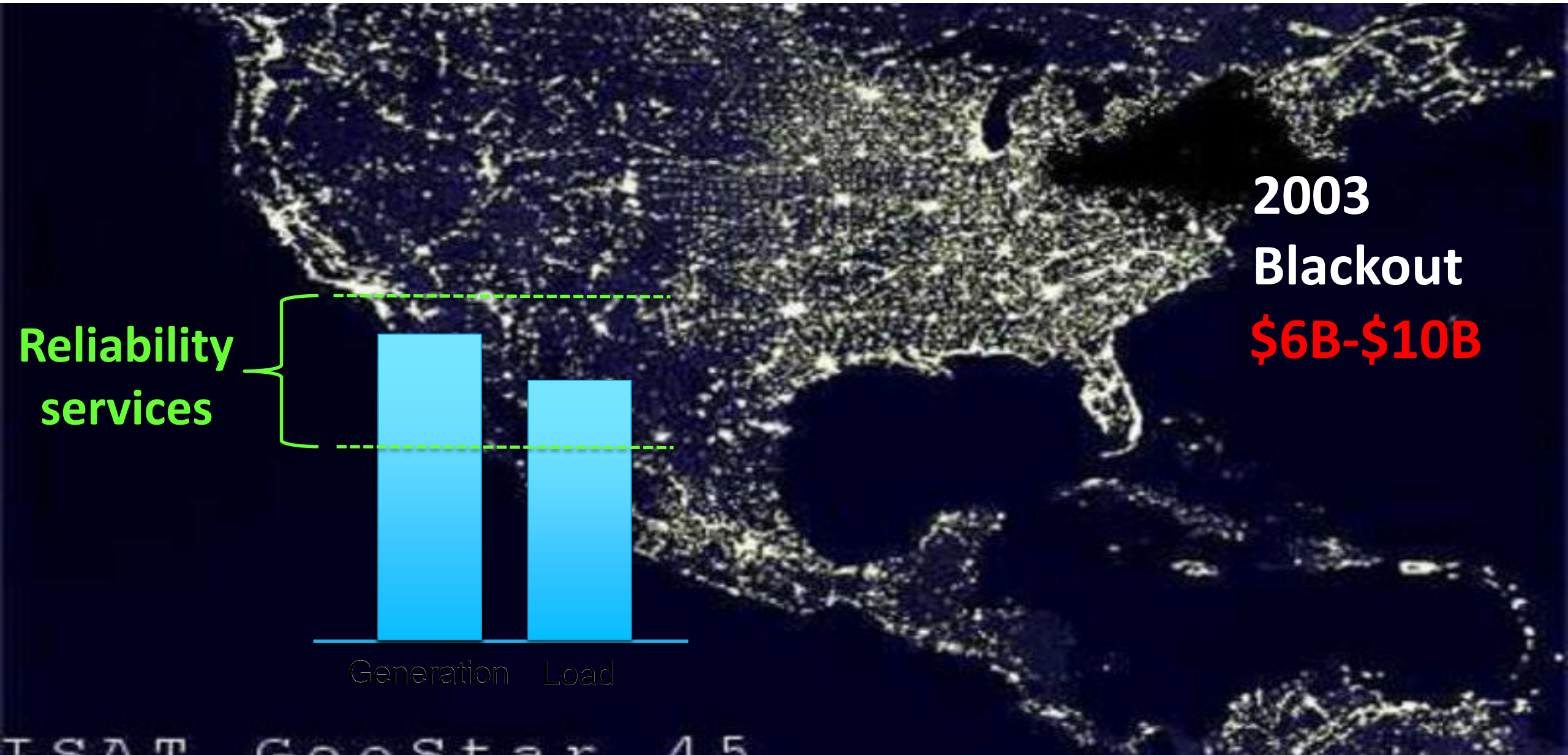
Reliability Services: Keep the Lights On



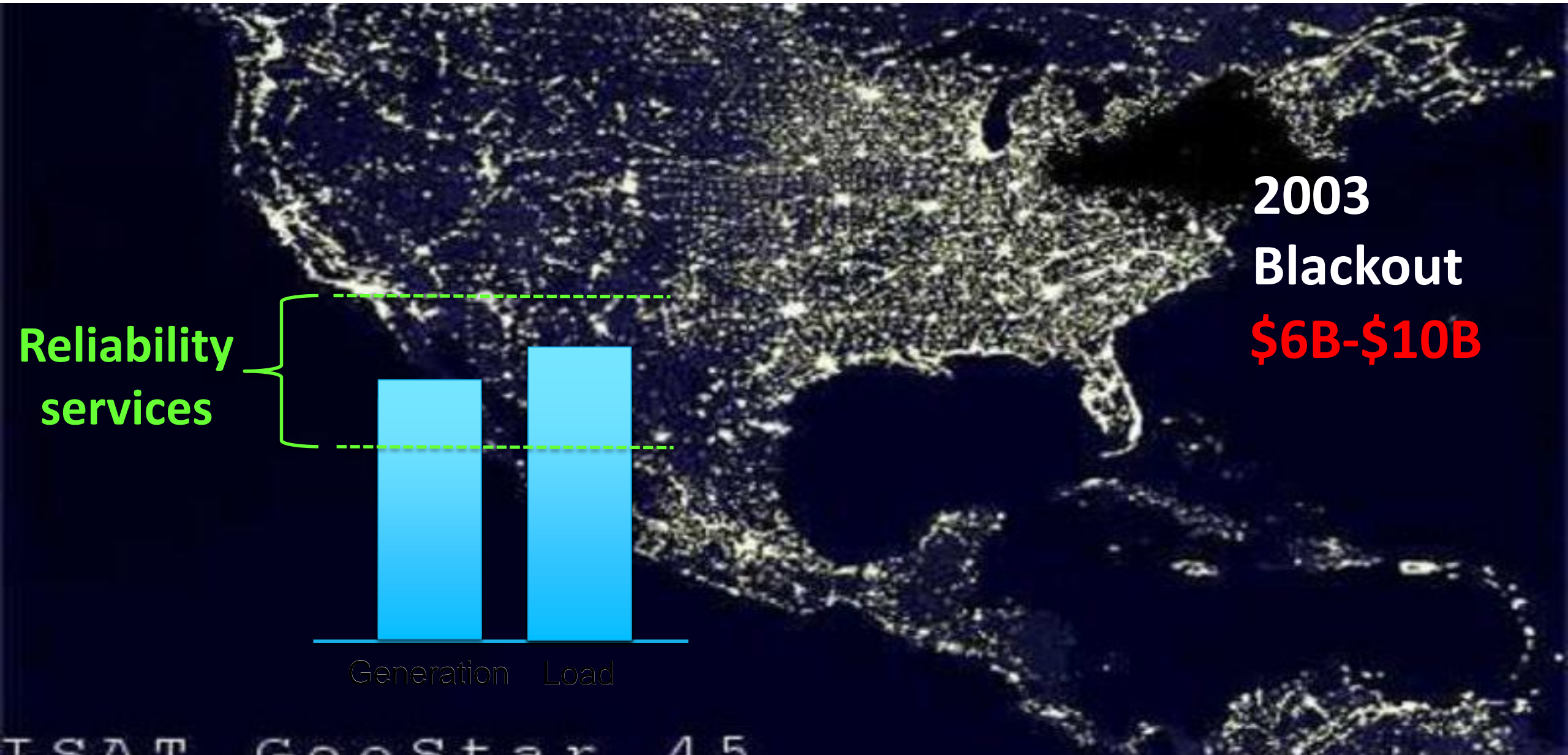
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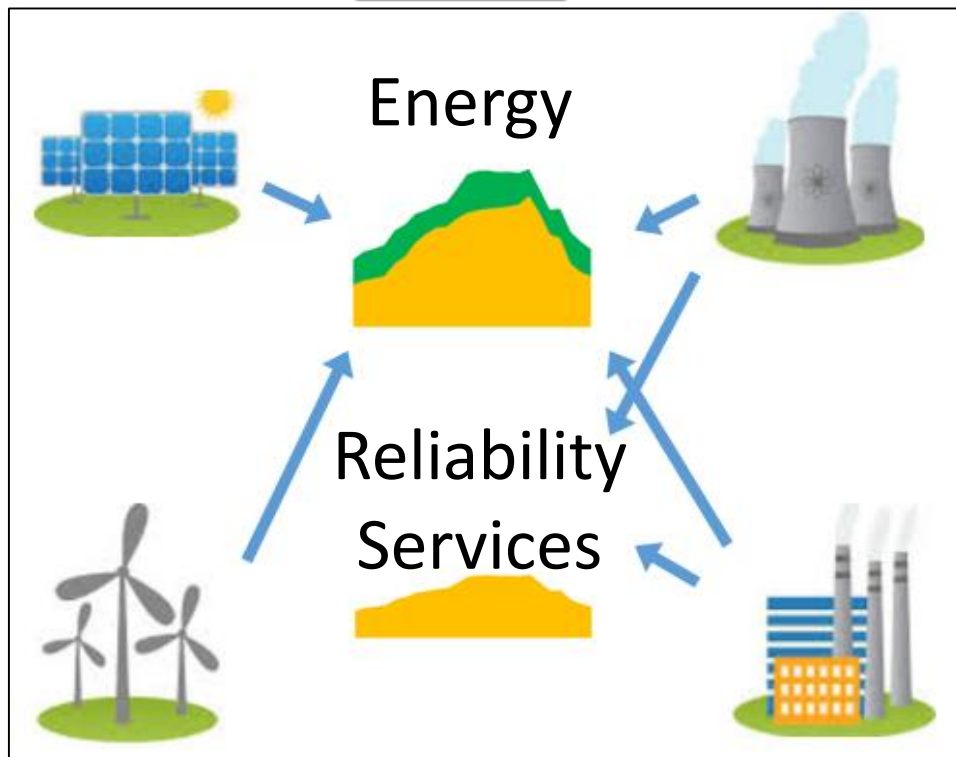
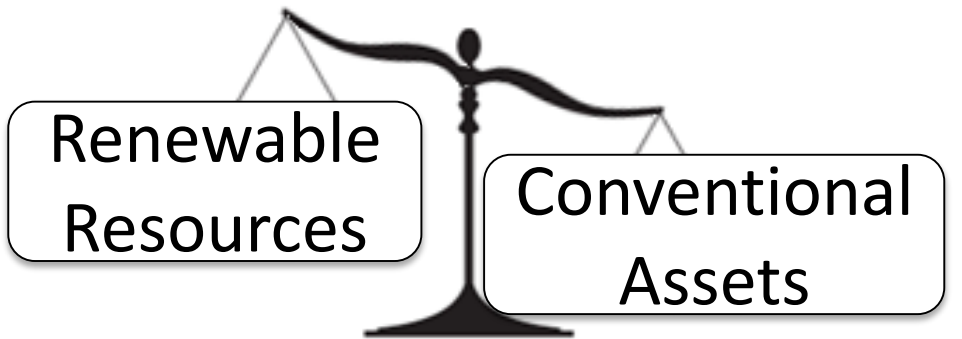


Reliability Services: Keep the Lights On

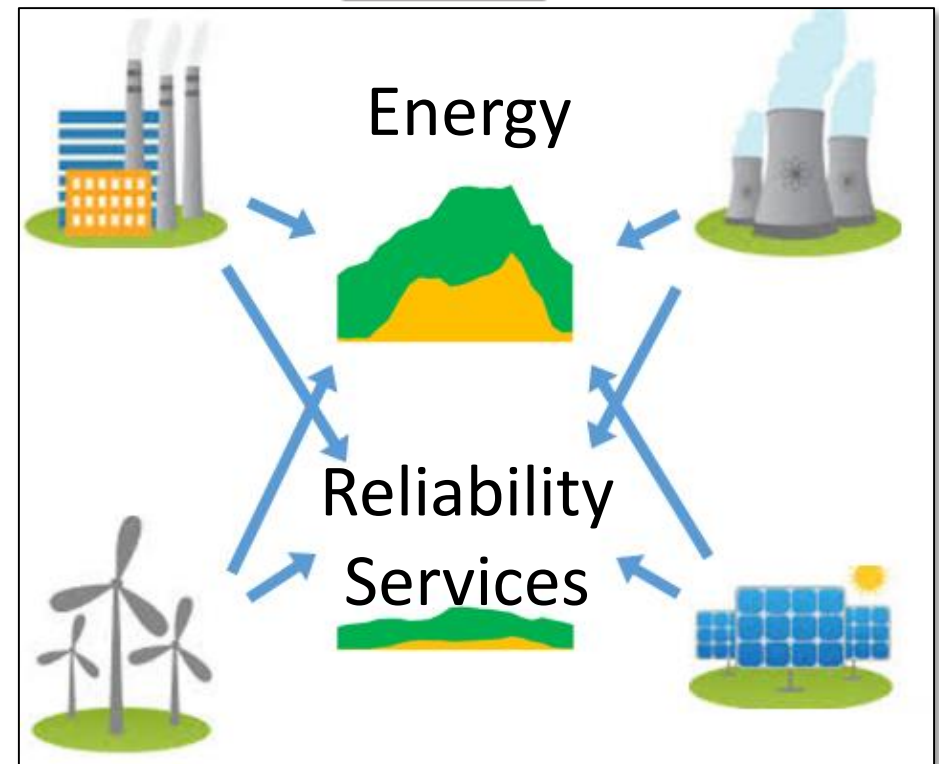


Acquire Reliability Services from All Assets: Requires Quantification of Asset Risk and System Risk

Existing paradigm

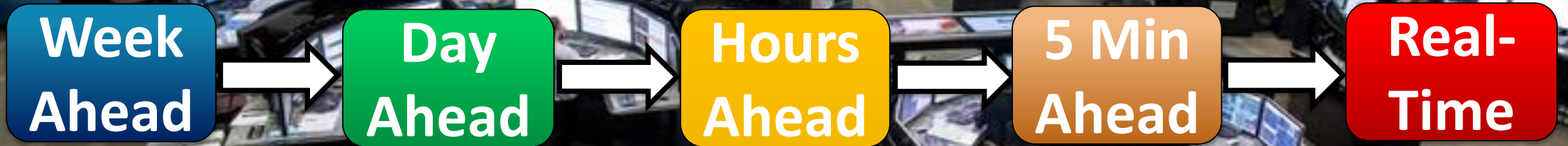


Future paradigm



The Challenge

**Operational
Flexibility Decreases**



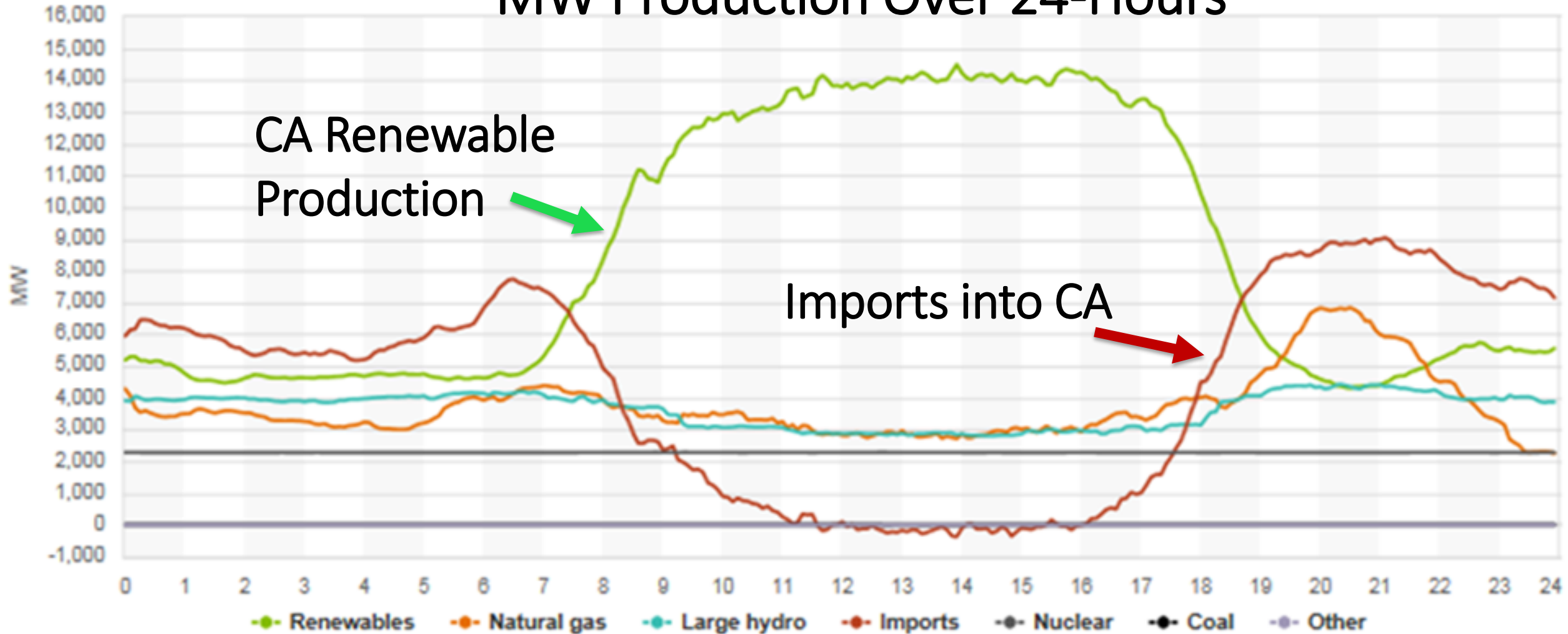
**Confidence in Intermittent
Resources Increases**

California: April 9, 2019

Net Imports to CA: Providing Most of the Flexibility

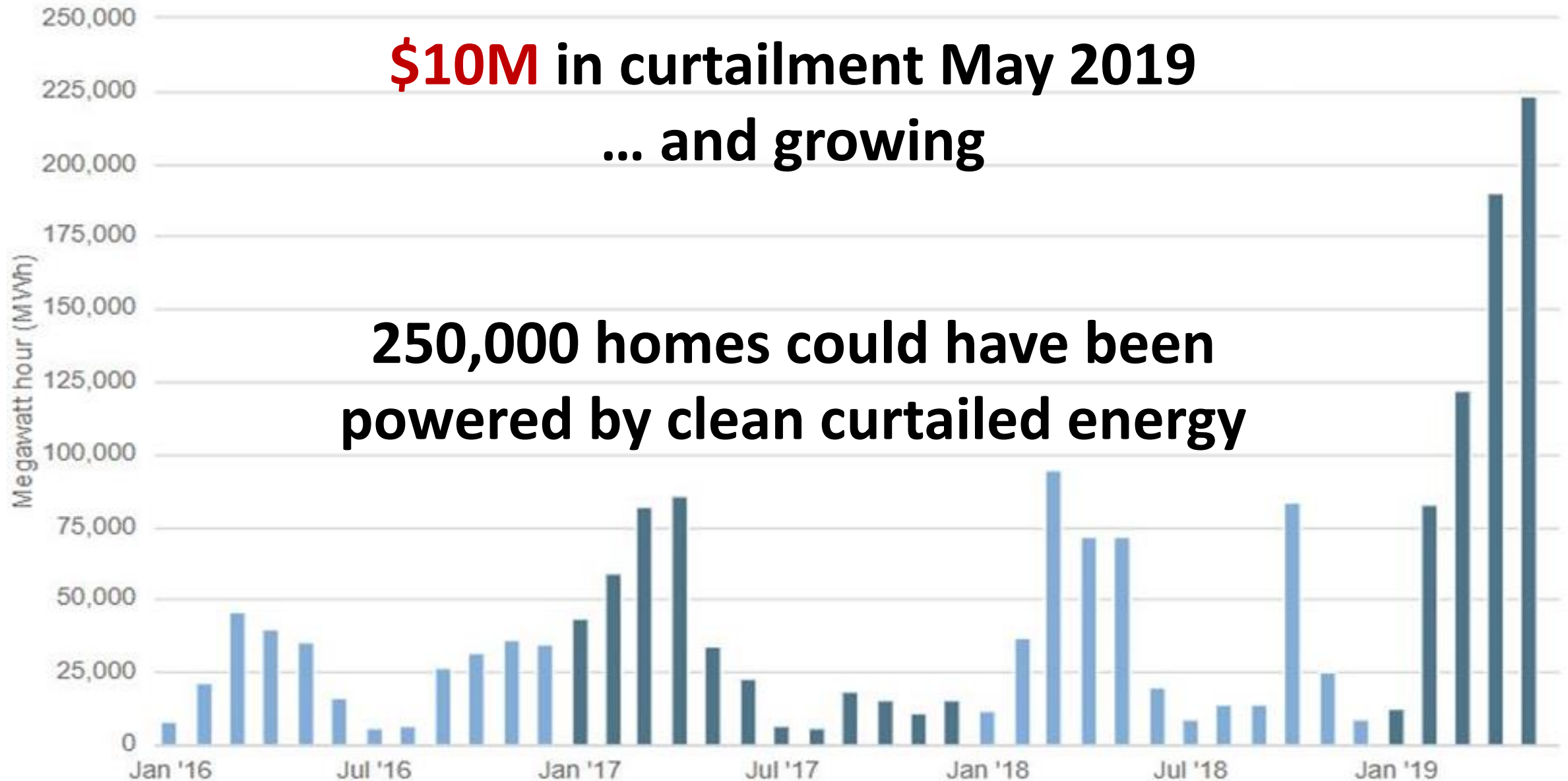
04/09/2019

MW Production Over 24-Hours



California: 2015-2019

Monthly Wind and Solar Curtailment



The Ask: Common Risk Management Framework for the Modern Grid

Quantify Asset Risk

Evaluate and Hedge System Risk Position

Leverage Flexibility from All Assets

Value Asset Performance

We seek your feedback and input!

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ARPA-E Office Hours:

Wednesday, 8am-9am

Outside of Adams Ballroom

